



U.S. DEPARTMENT OF
ENERGY

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INFORMATION Management Conference

Raising the Bar... Seeking Innovative Solutions for Tomorrow's Challenges



DOE Segment Architecture

*A Step-by-Step Guide to FSAM
in the Real World*

Presenter:

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Deloitte Consulting

March 3, 2009

Topics

Enterprise Architecture Overview

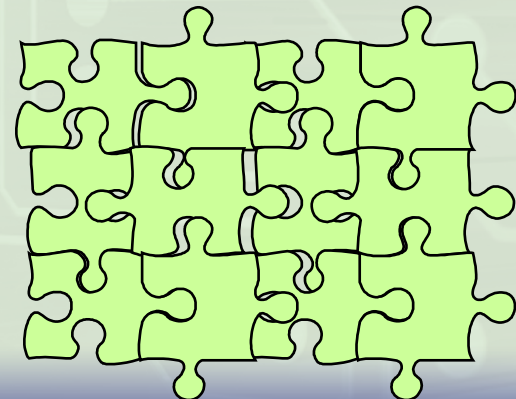
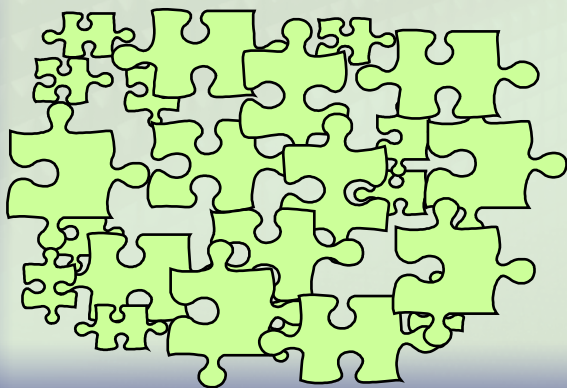
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Federal Segment Architecture Framework (FSAM) Overview

FSAM Step-by-Step: Best Practices and Lessons Learned

OMB Requirements

DOE Segment Architecture Support Services



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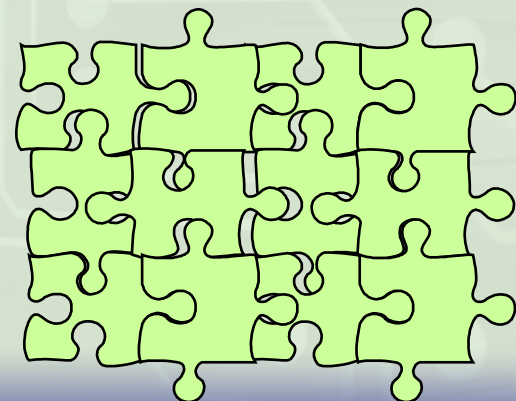
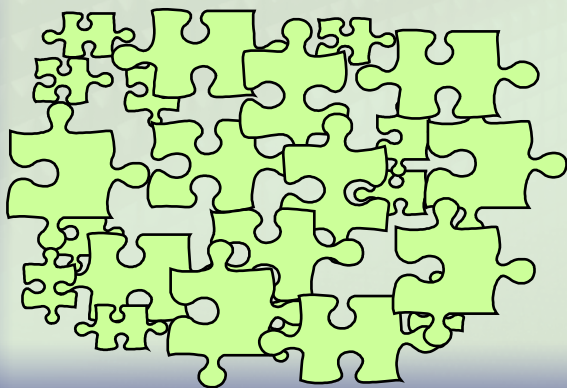
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Enterprise Architecture Overview

What is Enterprise Architecture (EA)?

“. . . the practice of applying a **comprehensive and rigorous** method for describing a current or future structure for an organization's processes, information systems, personnel and organizational subunits so that they **align with the organization's core goals and strategic direction**. -- Wikipedia

What is the Value of EA?

EA enables business *transformation*, giving senior executives and other decision makers the ability to:

- ❑ *Visualize where they are and where they are going*
- ❑ *Make decisions about the best way to get there*
- ❑ *Understand whether they are making progress.*

Just as one would never contemplate renovating an office tower or nuclear reactor without current and target blueprints . . .

Building without a Plan: The “Winchester” House



- ❑ No architectural blueprint exists
- ❑ 38 years of construction:
147 builders, 0 architects
- ❑ 160 rooms: 40 bedrooms, 6 kitchens,
two basements, 950 doors
- ❑ Unique features: 65 doors to blank walls, 13
abandoned staircases, 24 skylights in floors
- ❑ ***Transforming organizations without
blueprints yields analogous results.***

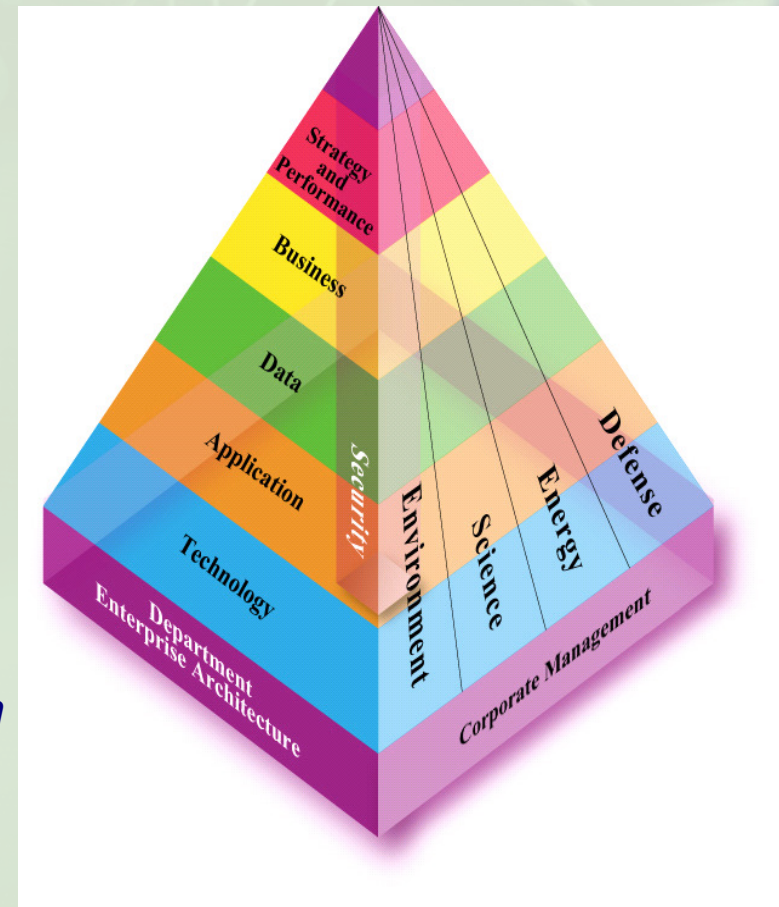


Enterprise Architecture at DOE

DOE models all components of its current and future structure (goals, people, processes, systems), taking a business-driven, top-down approach:

- ❑ Organizational strategies, capabilities, and performance metrics
- ❑ Business functions and processes
- ❑ Information / data needs
- ❑ System/ application / services
- ❑ Enabling technology infrastructure.

DOE blueprints these components, along with human capital and security threads, using specific, standardized organizational and system modeling techniques.





EA Answers DOE Business Questions

- ❑ What capabilities do we have and do we need to meet our goals?
- ❑ How do we track billions of dollars in short-term energy investments from the stimulus package?
- ❑ How do we optimize decision making around longer-term investments in, e.g., energy efficiency, and alternative energy sources?
- ❑ How can we deliver new capabilities faster, and bring to market more quickly the technologies we develop?
- ❑ What organizations/systems/processes are we supporting today, which ones have similar functions and activities, and how can we promote collaboration and reuse?
- ❑ How does an investment fit with our strategic objectives and long-term vision, and how should we prioritize initiatives?
- ❑ How do we enable transparency, and how can we assess program results – what is the impact of project deliverables on DOE performance metrics?
- ❑ Who will need to be retrained and where are they located?

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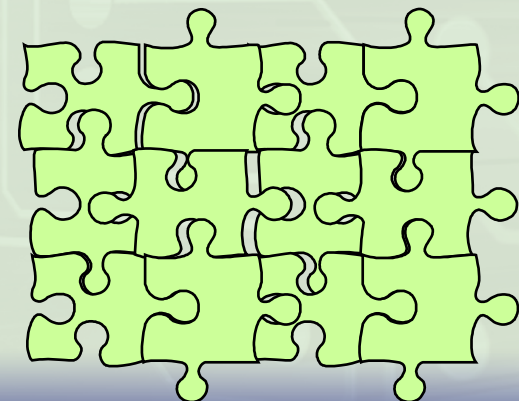
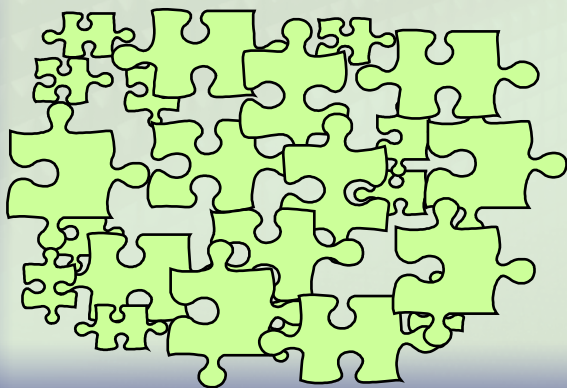
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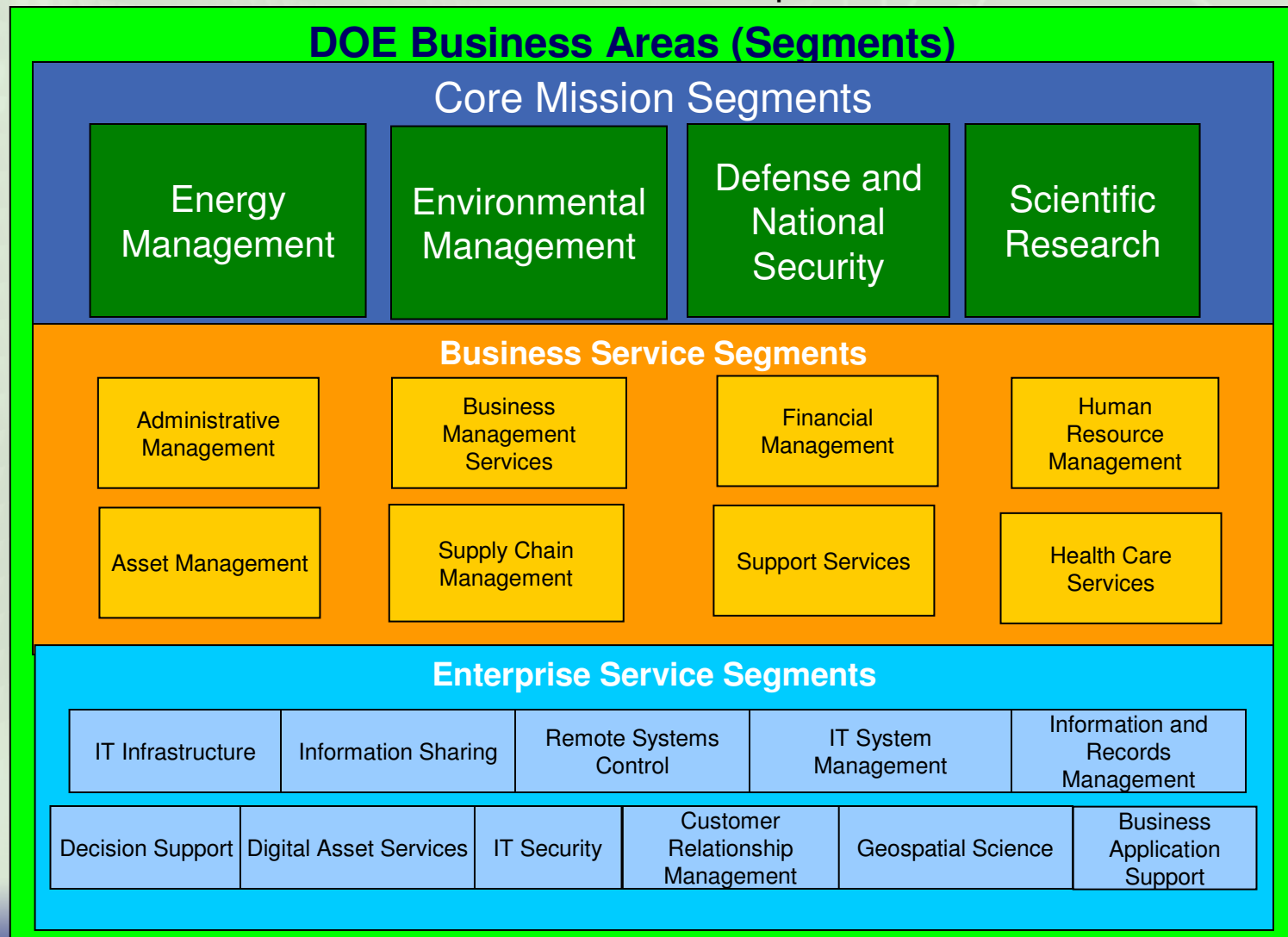


What is Segment Architecture?

- ❑ Segments are portions or business areas of the organization.
- ❑ Segment architecture is the “deep dive” into a more narrowly scoped business function.
- ❑ *DOE has identified 23 segments, representing:*
 - **Core mission Lines of Business** (e.g., Energy Management, Environmental Management, Defense and National Security, Scientific Research)
 - **Cross-cutting back-office services** (e.g., financial management, human resources).
 - **Enterprise IT services** (e.g., consolidated infrastructure).
- ❑ Segment architecture should mean *both compliance and value*:
 - OMB requires DOE to justify budget requests, aligning with CPIC processes
 - PSOs can derive real value by decomposing DOE’s EA to the segment and sub-segment level, yielding actionable information to make better decisions.

DOE's Current Segments

These 23 approved DOE segments are expected to change after further consolidation and decomposition.



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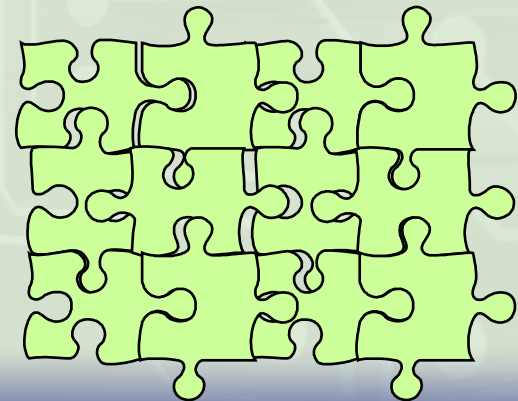
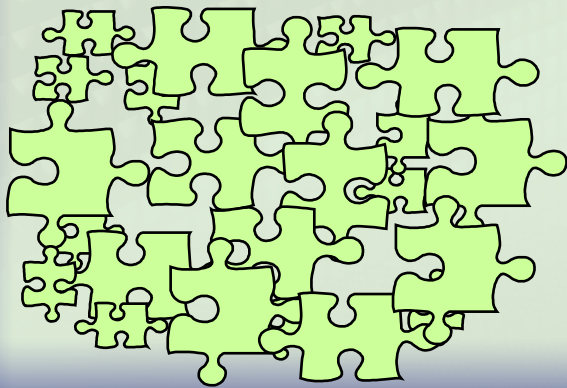
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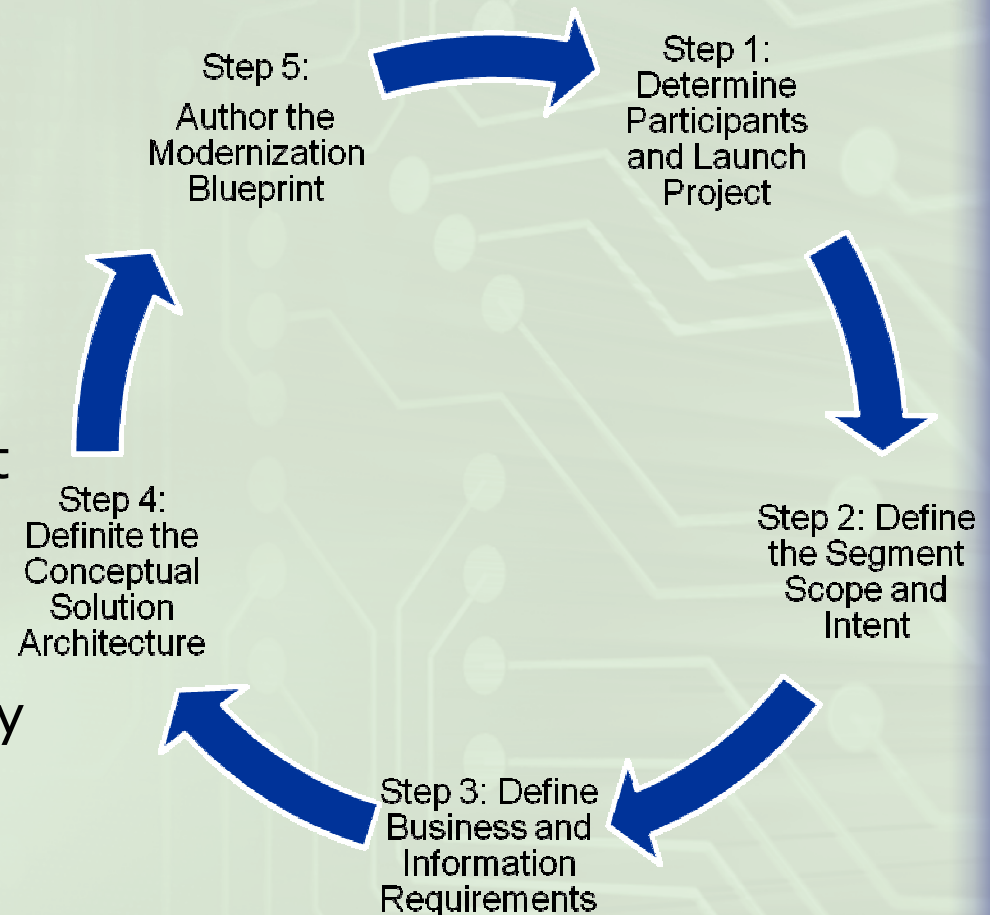
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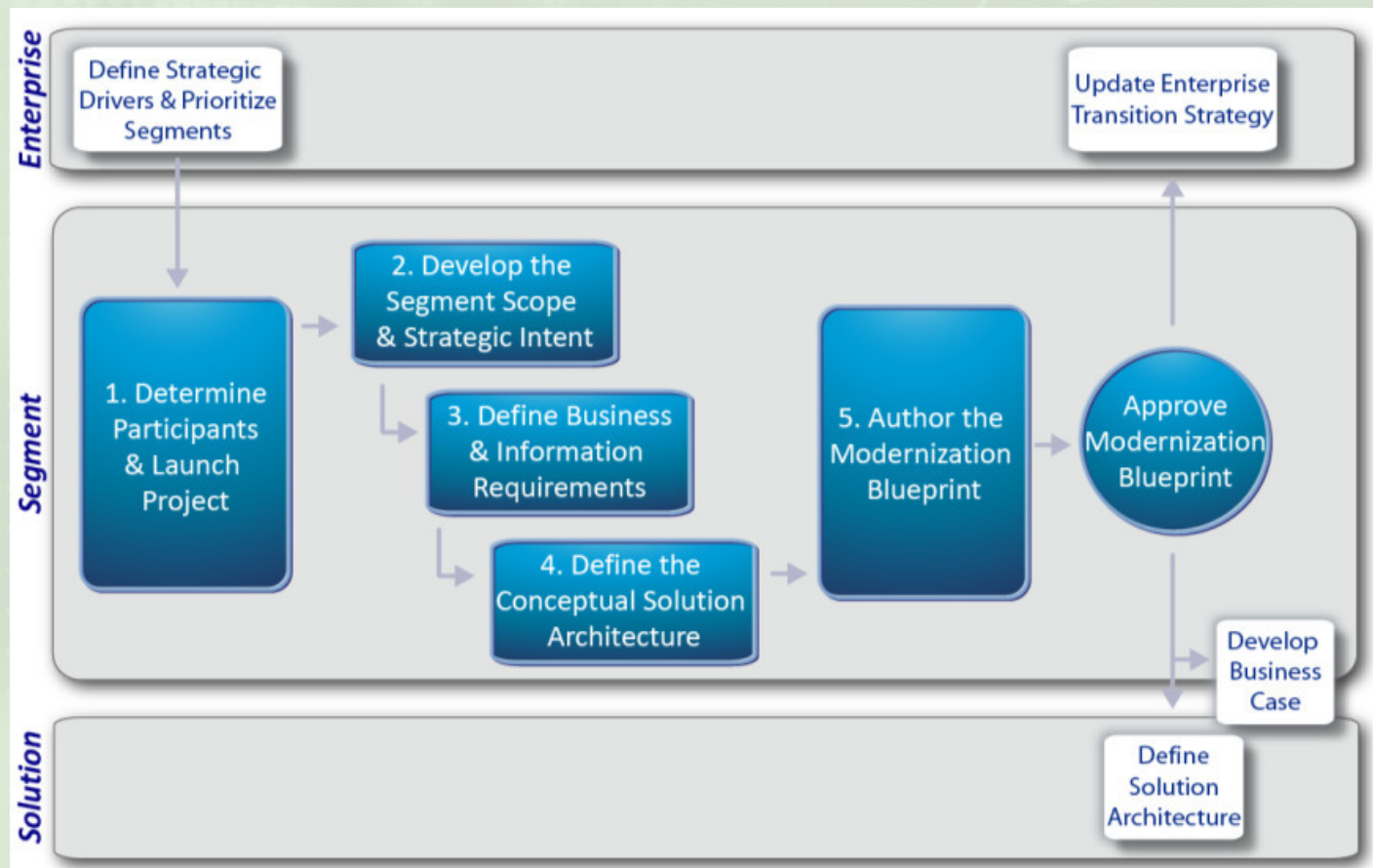
What is the Federal Segment Architecture Methodology (FSAM)?

- ❑ A repeatable process and best practice approach to developing segment architectures in a government context
- ❑ Developed by over 50 volunteers from government and industry
- ❑ Aligned with DOE's EA Framework and methodology
- ❑ Being used *today* by executive sponsors of DOE segments.



FSAM Process: Top Level

At the highest level, FSAM has *five process steps* for: identifying executive sponsorship, validating strategic objectives and performance improvement opportunities, defining capabilities gaps, and blueprinting the Target Architecture and transition strategy.

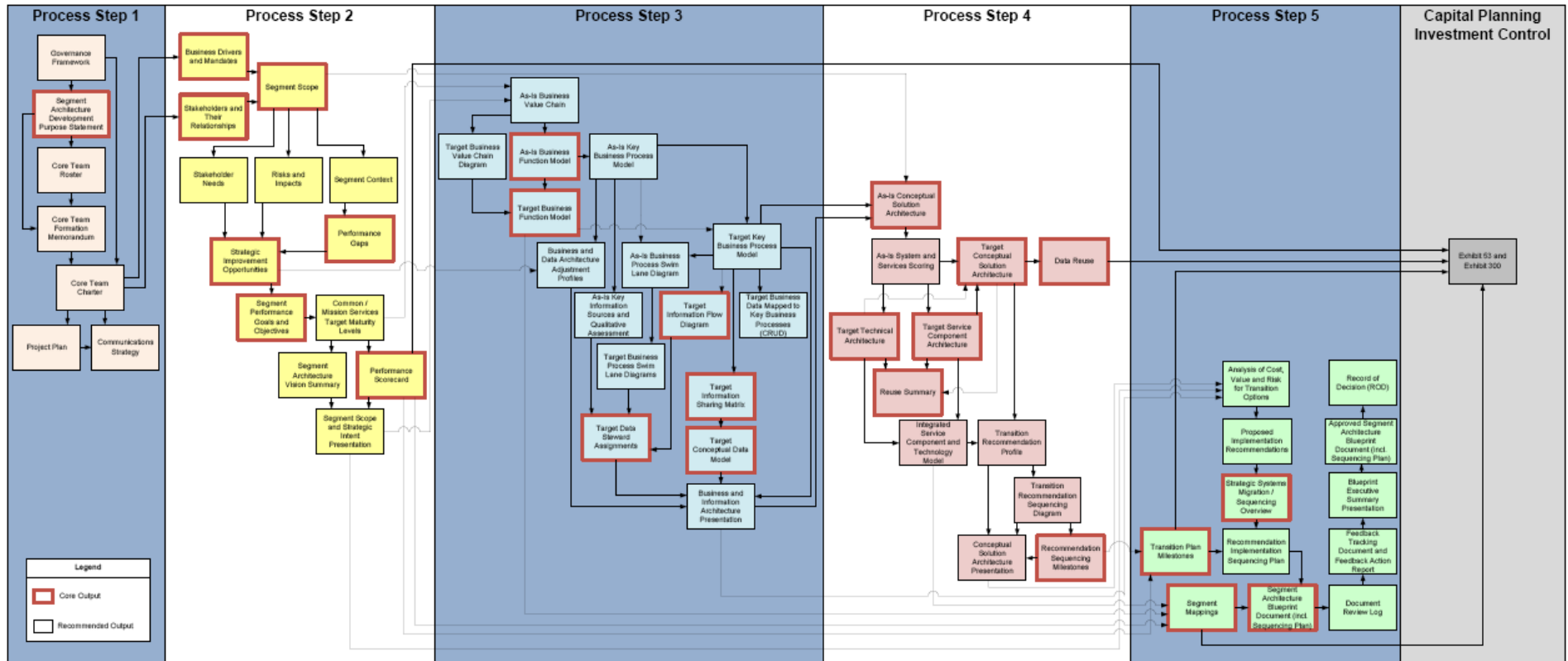




FSAM Process Step Outputs

Segment teams can use FSAM to create at least 54 different artifacts.

Federal Segment Architecture Methodology (FSAM) Process Step Outputs



Core FSAM Outputs provide the information necessary for WAAV v3.0 reporting requirements

Non-Core FSAM Outputs provide additional information that can be used to inform decision making related to the segment mission, business, and information needs.

Version 1.0
December 2008

Each of the five process steps are broken down by activities and tasks.

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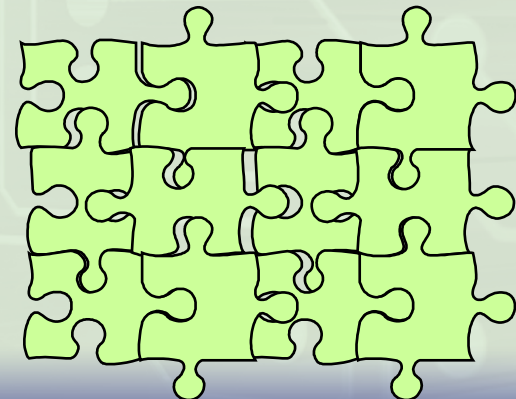
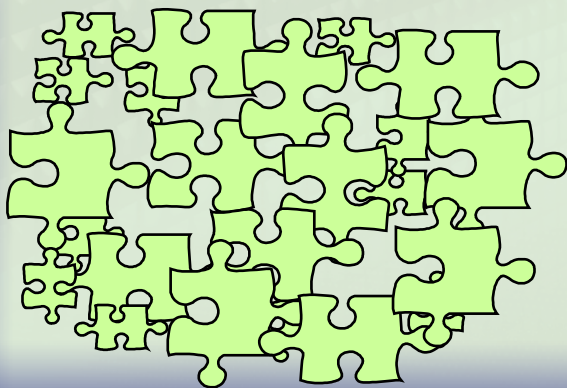
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Lessons Learned: Pre-Step 1 Activities

Before initiating Step 1, there are several pre-requisite activities we recommend:

- ❑ *Do your homework!* Read strategic plans, analyze investment (CPIC) data, talk to stakeholders, review existing artifacts.
- ❑ Understand a segment's size and complexity.
- ❑ Start *building trusted relationships*.
- ❑ Focus on critical success factor of *top-level executive support and understanding*.
- ❑ Carefully plan an effective kickoff; know your objectives and key messages.

Step 1: Launch

Purpose	<p>Architects identify PSO stakeholders of the segment, determine the executive sponsor (the Segment Owner, who establishes segment governance framework), and officially launch the segment development project. Draft a <i>purpose statement</i> to guide architecture development, and develop a project plan and communications strategy. (Make sure pre-requisite activities have been completed and FSAM steps are well understood before undertaking Step 1.)</p>	
Key Questions	<ul style="list-style-type: none"> • What is the governance framework for the development of the segment architecture? • Does the business owner(s) understand the process and time commitment for developing the segment architecture? • Who is the executive sponsor? • Who is on the core team? Are these the right people? • What is the specific purpose for developing this segment architecture; what are the common business challenges across the business owners? • Is the charter approved to develop the segment architecture in the context of the purpose statement crafted by the business owner(s)? • Is there a project plan and communications strategy for the development of the segment architecture? 	
Artifacts (Work Products)	Core/Required: <ul style="list-style-type: none"> • Segment Architecture Development Purpose Statement 	Supporting: <ul style="list-style-type: none"> • Governance Framework • Core Team Roster • Core Team Formation Memorandum • Core Team Charter • Project Plan • Communications Strategy



Lessons Learned: Failure to Launch?

- ❑ *Effective communications is a critical success factor.* Learn about stakeholder pain points and needs. Connect EA with the way segment stakeholders define value. Use business terms, not EA jargon. Define roles and expectations early.
- ❑ Make sure all the interested PSOs and stakeholders are represented in the segment governance committee.
- ❑ The number one cause of segment architecture project failure: *Lack of adequate stakeholder buy-in.*

Step 2: Develop Scope and Strategic Objectives

Purpose	<p>Segment Team defines scope of the segment and seeks to identify and prioritize strategic opportunities for improvement in the segment / business area, based upon the needs of the business stakeholders. The architect then defines the segment strategic intent, which consists of the target state vision, performance goals, and common / mission services and their target maturity levels.</p>	
Key Questions	<ul style="list-style-type: none"> • Based on the high-level problem statement, what are the strategic improvement opportunities and gaps? <ul style="list-style-type: none"> • What are the major common / mission services associated with the strategic improvement opportunities? <ul style="list-style-type: none"> • Who are the segment stakeholders and what are their needs? <ul style="list-style-type: none"> • What is the scope of the segment architecture? • What are the current segment investments, systems, and resources? • What are the deficiencies within the segment or the inhibitors to success? <ul style="list-style-type: none"> • What is the target state vision for the segment? • What is the performance architecture through which the transition to the target state vision can be evaluated? 	
Artifacts (Work Products)	Core/Required: <ul style="list-style-type: none"> • Business Drivers and Mandates • Segment Scope • Performance Gaps • Strategic Improvement Opportunities • Segment Performance Goals and Objectives • Performance Scorecard 	Supporting: <ul style="list-style-type: none"> • Stakeholders and Their Relationships • Segment Context • Stakeholder Needs • Risk and Impacts • Common / Mission Service Target Maturity Levels • Segment Architecture Vision Summary

Lessons Learned: Plan Carefully

- ❑ When scoping the work, *don't try to boil the ocean overnight*. Consider a phased approach, in which the segment will be further decomposed.
- ❑ Don't make the perfect the enemy of the good. Stakeholders want to see value early and often, so look for *low-hanging fruit* for developing actionable artifacts that address pressing business needs.
- ❑ While budget requests and planned projects are a good indicator of the Target Architecture, don't forget that *architecture should drive investments, and not vice versa*.
- ❑ *Plan carefully*. Use project management discipline in planning and controlling the project.

Step 3: Define Business and Information Requirements

Purpose	Analyze and determine the business and information improvement opportunities that will achieve the target performance architecture. Begin with a holistic view of the overall business and information requirements and gaps associated with the strategic improvement opportunities to achieve the target performance architecture.		
Key Questions	<ul style="list-style-type: none"> • How well does the current business and information environment perform? • How should the target business and information environment be designed? • Have the segment's goals and performance objectives been translated into an actionable and realistic target business and information architecture expressed within business functions, business processes, and information requirements? • Have the business & information requirements been analyzed and documented to the lowest level of detail necessary to form actionable recommendations? • Did the business and information analysis provide a synchronized and cohesive set of recommendations? • Does the core team understand the adjustments that are required for the current business and information environments to fulfill the target performance architecture? 		
Artifacts (Work Products)	<table> <tr> <td data-bbox="491 1070 1136 1373"> Core/Required: <ul style="list-style-type: none"> • As-Is Business Function Model • Target Business Function Model • Target Conceptual Data Model • Target Data Steward Assignments </td><td data-bbox="1136 1070 1915 1373"> Supporting: <ul style="list-style-type: none"> • As-Is Business Value Chain • As-Is Key Business Process Model • As-Is Business Process Swim Lane Diagram • As-Is Key Information Sources and Qualitative Assessment </td></tr> </table>	Core/Required: <ul style="list-style-type: none"> • As-Is Business Function Model • Target Business Function Model • Target Conceptual Data Model • Target Data Steward Assignments 	Supporting: <ul style="list-style-type: none"> • As-Is Business Value Chain • As-Is Key Business Process Model • As-Is Business Process Swim Lane Diagram • As-Is Key Information Sources and Qualitative Assessment
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Lessons Learned: Artifacts, Tools, and Repositories

- ❑ **Tailor the work to the needs of the segment.** Particular segments may benefit from non-core FSAM, and even non-FSAM, artifacts to derive additional value.
- ❑ **Use an EA Tool and Repository.** If artifacts are the puzzle pieces, commercial EA tools are the main way to easily visualize and align them.
- ❑ Without an EA approach and tool, one can't readily see all the complex connections between strategy, capabilities, process, people, data, systems, and infrastructure.

Step 4: Define Conceptual Solution Architecture

Purpose	Produce an integrated view of the combined systems, services, and technology architectures that support the target performance, business, and data architectures developed in the preceding process steps. This also includes developing recommendations for transitioning from the current (as-is) state to the target state.		
Key Questions	<ul style="list-style-type: none"> • What existing systems and services are deployed within the as-is conceptual solution architecture? How well do the existing systems and services currently support the mission? Which systems and services should be considered for retirement and / or consolidation? • What does the target conceptual solution architecture need to include to fulfill the target performance architecture? • Are target business functions, systems, & service components reusable? • Does the conceptual solution architecture support the target performance, business, and data architectures developed in prior steps, along with recommendations for transitioning from the as-is state to the target state? • Have the dependencies, constraints, risks, and issues associated with the transition been analyzed to identify alternatives to be considered? 		
Artifacts (Work Products)	<table border="1"> <tr> <td data-bbox="493 1063 1144 1450"> Core/Required: <ul style="list-style-type: none"> • As-Is Conceptual Solution Architecture • Target Conceptual Solution Architecture • Target Service Component Architecture • Target Technical Architecture • Reuse Summary • Data Reuse • Recommendation Sequencing Milestones </td><td data-bbox="1144 1063 1911 1450"> Supporting: <ul style="list-style-type: none"> • As-Is System and Services Scoring • Integrated Service Component and Technology Model • Transition Recommendation Profile • Transition Recommendation Sequencing Diagram </td></tr> </table>	Core/Required: <ul style="list-style-type: none"> • As-Is Conceptual Solution Architecture • Target Conceptual Solution Architecture • Target Service Component Architecture • Target Technical Architecture • Reuse Summary • Data Reuse • Recommendation Sequencing Milestones 	Supporting: <ul style="list-style-type: none"> • As-Is System and Services Scoring • Integrated Service Component and Technology Model • Transition Recommendation Profile • Transition Recommendation Sequencing Diagram
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Lessons Learned: Architecting in an Imperfect World

- ❑ Many existing initiatives will not have a clear line-of-sight with enterprise or Line of Business strategic drivers.
- ❑ Architecture happens in the real world – requiring both top-down and bottom-up efforts.
- ❑ Determine how well aligned are existing IT projects with organizational strategic objectives, and business and information requirements.
- ❑ Document and develop artifacts to show alignment and misalignment, as well as opportunities for reuse and instances of duplication and waste.
- ❑ Leverage ongoing efforts, which often will address many of the needed components of the EA-driven solutions architecture.

(continued)



Lessons Learned: Architecting in an Imperfect World (Part Two)

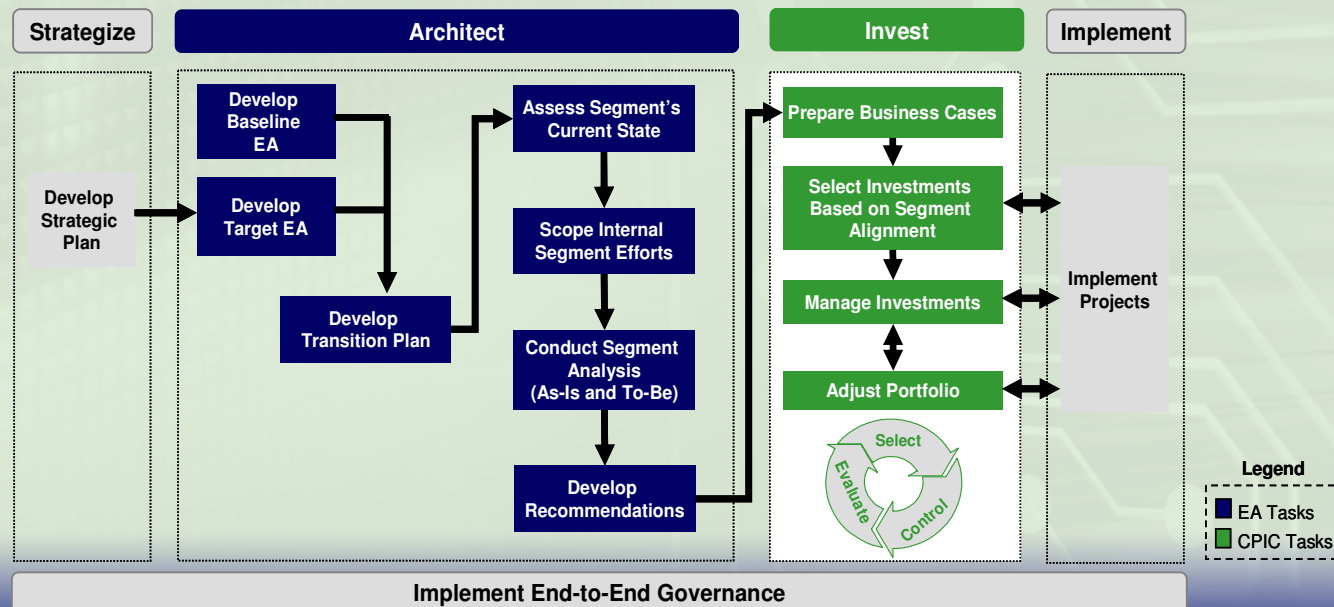
- ❑ EA will reveal duplicative efforts, wherein funds can be redirected into other critical, but unfunded, needs.
- ❑ **Be aware of the emotions that come from transparency.** Be fact based and data driven, not judgmental. Architects must be willing to tolerate imperfection, and maintain the big picture.
- ❑ Ongoing and formerly “rogue” projects can be documented in the Enterprise Transition Plan.
- ❑ Even if some artifacts and templates are developed for OMB compliance, one can leverage them for DOE value.
- ❑ OK to start at the highest level of the segment (inch deep), and later decompose to lower levels of detail.

Step 5: Author Modernization Blueprint

Purpose	<p>Leverage outputs from previous process steps to create a detailed, <i>actionable</i> segment-architecture modernization blueprint including sequencing and transition plans. It should comprise implementation recommendations, supported by holistic analysis of segment business, data, technology, systems, and service components. The blueprint can span a strategic time horizon of 3-5 years. The approved blueprint should yield business cases for funding requests (future projects), as well as updates to DOE's Enterprise Transition Plan.</p>	
Key Questions	<ul style="list-style-type: none"> • Have the findings from the previous steps been identified and categorized? • Have the transition options been analyzed for costs, benefits, and risks in order to develop recommendations for implementation? <ul style="list-style-type: none"> • Are the recommendations described in a detailed, actionable segment architecture blueprint, supported by a holistic analysis of segment business, data, technology, and service components? • Has the blueprint and sequencing plan been reviewed and approved by the segment governance group? 	
Artifacts (Work Products)	Core/Required: <ul style="list-style-type: none"> • Strategic Systems Migration / Sequencing Overview • Segment Architecture Blueprint Document (includes sequencing plan) • Segment Mappings • Transition Plan Milestones 	Supporting: <ul style="list-style-type: none"> • Analysis of Cost, Value, and Risk for Transition Options • Proposed Implementation Recommendations • Recommendation Implementation Sequencing Plan • Document Review Log • Feedback Tracking Document and Feedback Action Report

Lessons Learned: Integrate with Other Processes

- ❑ *Actionable* target architectures means leveraging outputs within other downstream processes, including :
 - performance management
 - investment portfolio management /CPIC
 - enterprise transition planning and project sequencing
 - solution architecture development
 - system lifecycle management.
- ❑ In the Architect-Invest-Implement cycle, Segment Architecture development should not only be the output of the Architect phase, but used throughout the Invest process life cycle (Select-Control-Evaluate).



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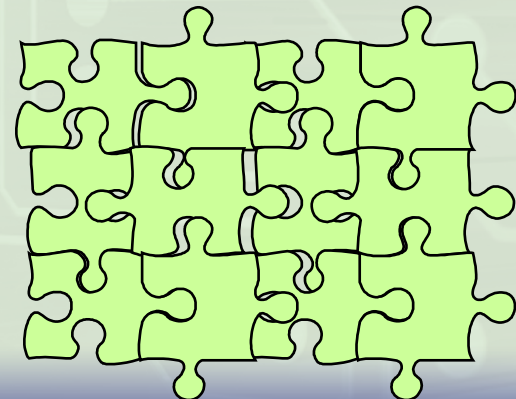
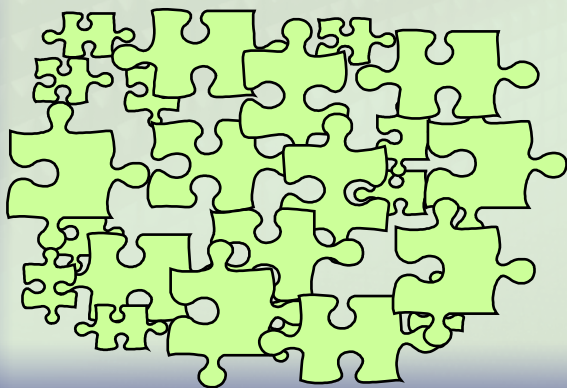
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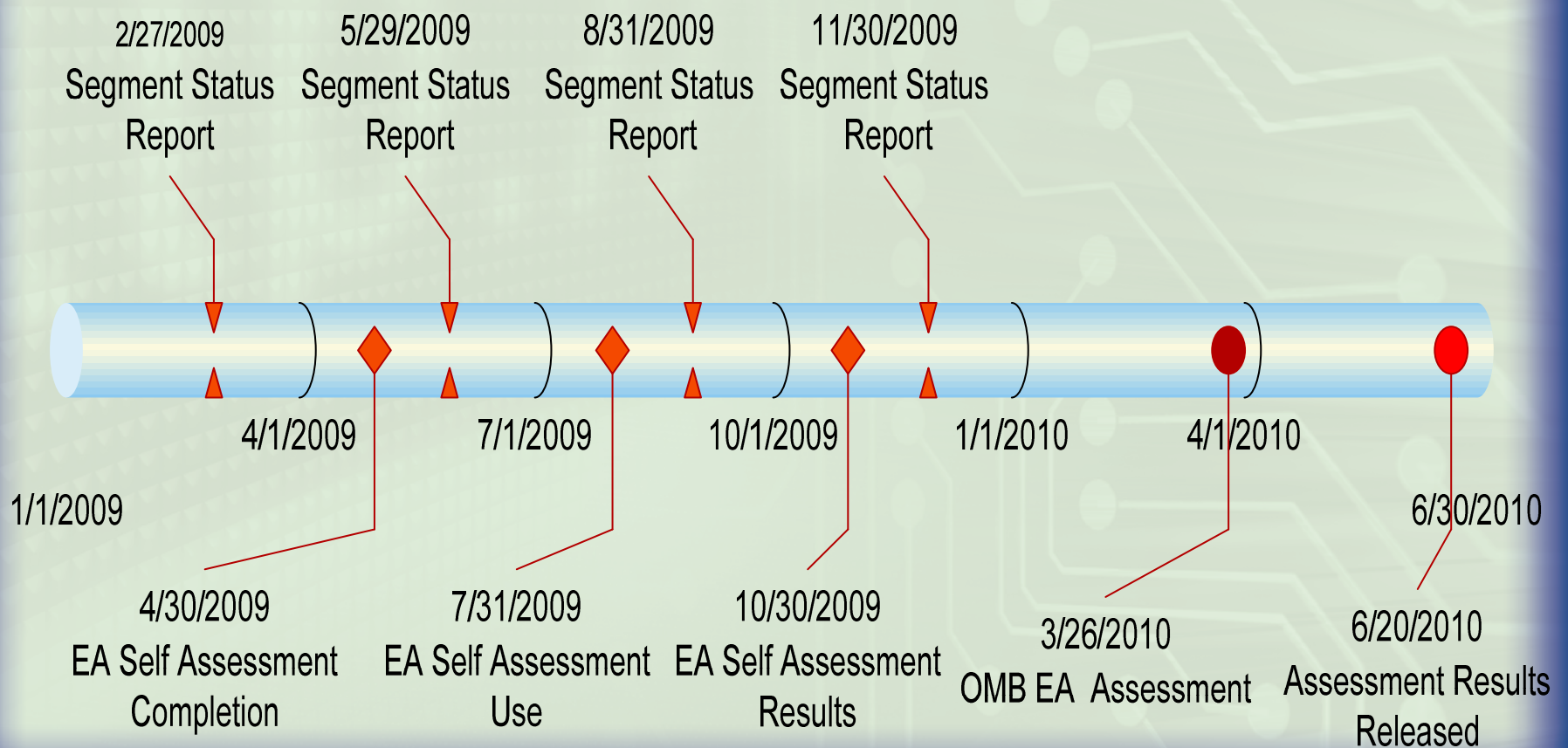
DOE Segment Architecture Support Services





OMB's Segment Reporting Requirements

OMB requires quarterly segment architecture progress reports, and three trimester EA assessments, covering Completion, Use, and Results. DOE's "completed" segment architectures must cover at least 50% of all investments (next year: 90%) to maintain its score.



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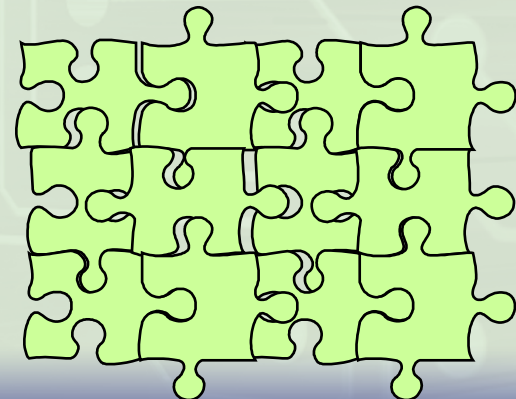
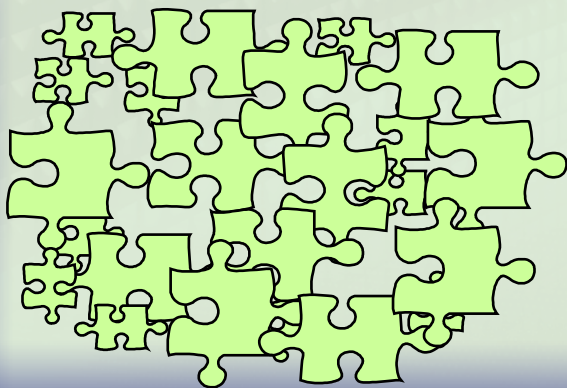
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DOE Segment Architecture Support Services

- ❑ DOE's HQ EA Program **mission** is to *facilitate development and use of DOE's EA, support Lines of Business in the development of their segment architectures, coordinate the Architecture Review Board governance process, and ensure that DOE is compliant with OMB and other federal requirements relevant to EA.*
- ❑ The DOE Chief Architect's **primary goal** is *coordinating an actionable, value-driven EA, by taking a customer-centric approach.*
- ❑ As different PSOs have different needs, the DOE EA Program offers diverse services* for PSOs, including:
 - Recommended standards, guidelines, frameworks, methodologies, and processes
 - Architecture training and EA capabilities maturation
 - Sample artifact templates
 - Coaching on architecture modeling and artifact development
 - Performing architectural modeling and artifact development
 - Strategic portfolio investment analysis
 - EA tool and repository support
 - Decision support and business intelligence services, based on EA and CPIC analysis
 - Segment building and governance facilitation, tailored to the needs of LoBs.

* Some resource-intensive services may require a chargeback, to defray exceptional costs.

Q and A

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Supporting Slides



Segment Architecture Reporting Templates

OMB's EA Segment Architecture Reporting templates demonstrate development and progress towards a well-defined Segment Architecture. These templates are supposed to be supported by FSAM artifacts.

Identification

- Provides descriptive information about the segment and its current state

Mapping

- Contains mappings of the segment to the FEA and to the investments, programs, and cross-agency initiatives

Performance

- Creates a comprehensive line of sight for segment performance as well as financial and non-financial success stories attributed in whole, or in part, to the segment architecture

Transition Planning

- Provides segment progress milestones to track the development of a segment within an agency. These milestones are different from those found in the Exhibit 300s

Collaboration & Reuse

- Provides information on business, data, and information systems / service reuse by the segment and partners or other stakeholders related to the segment.



OMB's Segment Reporting Templates

In the quarterly Segment Reports, OMB requires reporting on progress by populating standardized templates. The following is a list of required templates, which are based on the self-assessed level of each segment's maturity (notional, planned, in-progress, or complete).

OMB Template	Notional	Planned	In-Progress	Complete
Identification	<ul style="list-style-type: none"> Segment Name Segment Description Agency OMB Segment Code Segment Type Segment Phase Segment Priority 	<ul style="list-style-type: none"> Segment Name Segment Description Agency OMB Segment Code Segment Type Segment Phase Segment Priority 	<ul style="list-style-type: none"> Segment Name Segment Description Agency OMB Segment Code Segment Type Segment Phase Segment Priority 	<ul style="list-style-type: none"> Segment Name Segment Description Agency OMB Segment Code Segment Type Segment Phase Segment Priority
Mappings	<ul style="list-style-type: none"> Investments (Exhibit 53/ITBRS) Programs (PART program inventory) Cross-Agency Initiatives (E-Gov/FTF) 	<ul style="list-style-type: none"> Investments (Exhibit 53/ITBRS) Programs (PART program inventory) Cross-Agency Initiatives (E-Gov/FTF) 	<ul style="list-style-type: none"> Investments (Exhibit 53/ITBRS) Programs (PART program inventory) Cross-Agency Initiatives (E-Gov/FTF); FEA, BRM, SRM, TRM 	<ul style="list-style-type: none"> Investments (Exhibit 53/ITBRS) Programs (PART program inventory) Cross-Agency Initiatives (E-Gov/FTF); FEA, BRM, SRM, TRM
Performance		<ul style="list-style-type: none"> Business Performance 	<ul style="list-style-type: none"> Strategic Performance (PAR) Program Performance (PART) Business Performance 	<ul style="list-style-type: none"> Strategic Performance (PAR) Segment Performance Program Performance (PART) Business Performance
Transition Planning			<ul style="list-style-type: none"> Segment Progress Milestones 	<ul style="list-style-type: none"> Segment Progress Milestones
Collaboration & Reuse				<ul style="list-style-type: none"> Collaboration/Partners Business Reuse Data Reuse Info System/Service Reuse



Segment Architecture Maturity

OMB's Segment Architecture maturity levels define the degree of completeness for each segment.

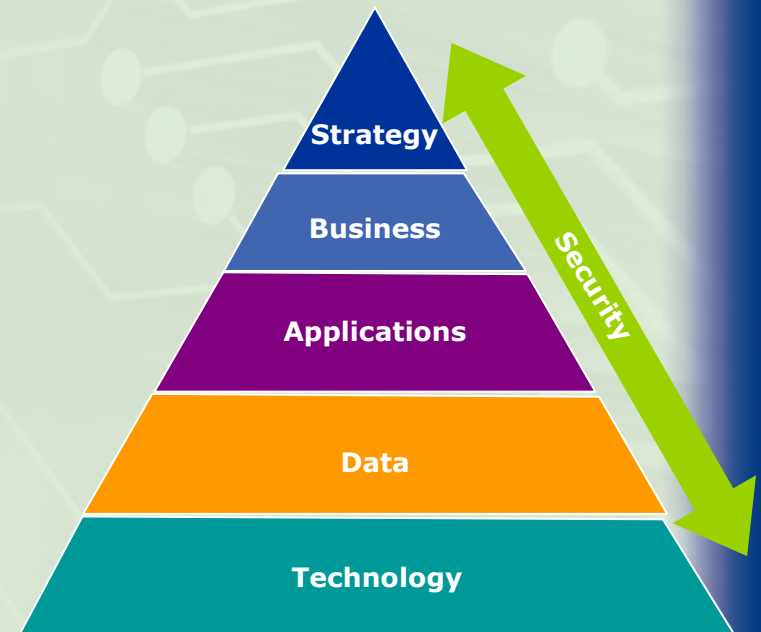
Notional	<ul style="list-style-type: none">• Denotes the concept of a segment that an Agency plans on developing
Planned	<ul style="list-style-type: none">• Contains additional information on the Segment Mappings, but may not include extensive performance milestones, or reusable objects
In-Progress	<ul style="list-style-type: none">• Completes a majority of the Segment Report, but may not have information on Collaboration and Reuse within the segment
Complete	<ul style="list-style-type: none">• Segment signed off by the mission or business owner• Completes the entire Segment Report, based on core artifacts aligned with the FSAM• Posts completed segment documents for sharing and collaboration with other Agencies



Enterprise Architecture Frameworks

Best practice EA frameworks (such as DOE's) document all enterprise components as represented in multiple, interconnected layers:

- **Strategy Layer** – Mission, vision, and strategic goals, initiatives, and plans; plus key performance metrics
- **Business Architecture** – Business processes performed that either address the core mission and strategic objectives or internal support needs
- **Applications/Systems/Services Architecture** – Application capabilities provided by systems
- **Data or Information Architecture** – Key data subjects managed by systems/data bases
- **Technology or Infrastructure Architecture** – Enabling technology supporting business, applications, and data
- **Security Thread** – requirements for data encryption, access control, audit trails, backup and recovery, and privacy cut across the EA .



Enterprise Architecture is a blueprint that describes the strategic drivers, business processes, applications, data, and technology used within an organization, and serves as a roadmap for change.



Segment Team Roles and Responsibilities

Segment Owners are executive sponsors / business owners from the PSOs . Segment owners are the primary decision-makers for the segment. Their role is described in greater detail on the next slide.

Segment Leads are OCIO employees who are responsible for the following:

- Facilitate and manage the day-to-day segment architecture development activities
- Organize and oversee segment meetings
- Own the segment work plan, and provide weekly status reports
- Serve as the primary OCIO - PSO liaison for all communications, though they can delegate communications to contractor staff with approval by the Segment Owner and PSO federal employee points of contact

Segment Stewards / Architects are contractors (supplied by OCIO, as needed) whose responsibilities include:

- Capturing required data and existing artifacts
- Developing new artifacts and architectural models as needed
- Populating the EA repository
- Preparing templates for required OMB submissions.



Segment Owner Roles and Responsibilities

- Represent Line of Business leadership, who own the segment, and all data associated with it
- Share the vision, strategic objectives, and needs, pain points, and challenges of their business area / segment
- Provide access to, validate, and approve all segment data and artifacts
- Collaborate with architects in the iterative development and delivery of their segment architecture
- Participate in scheduled segment development meetings and governance processes
- Share non-sensitive segment data with other DOE segments (to promote collaboration and reuse)
- Facilitate a collaborative environment within DOE
- Review and provide input on segment-specific content for OMB submissions